

EXAM Kai Tang

by Kai Tang

FILE	1748_KAI_TANG_EXAM_KAI_TANG_318756_228021689.DOCX (2.65M)		
TIME SUBMITTED	14-JAN-2021 05:18PM (UTC+0000)	WORD COUNT	233
SUBMISSION ID	142121810	CHARACTER COUNT	1148

Kai Tang

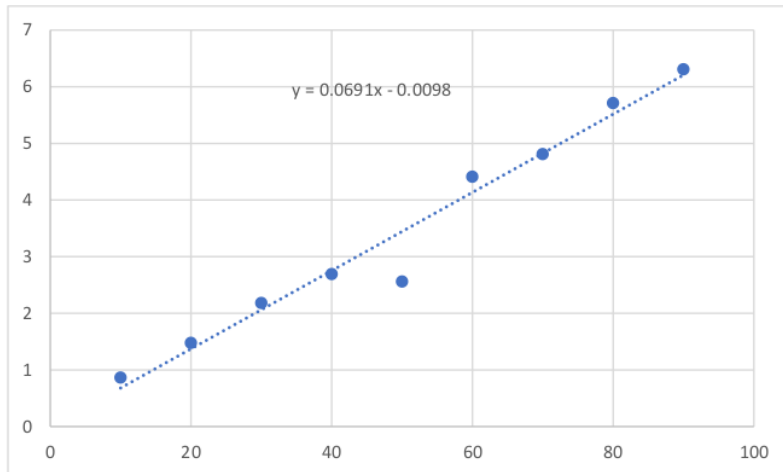
Transducers and Signal Conditioning EXAM

14/01/2021

[illegible]

Q1

20DEG



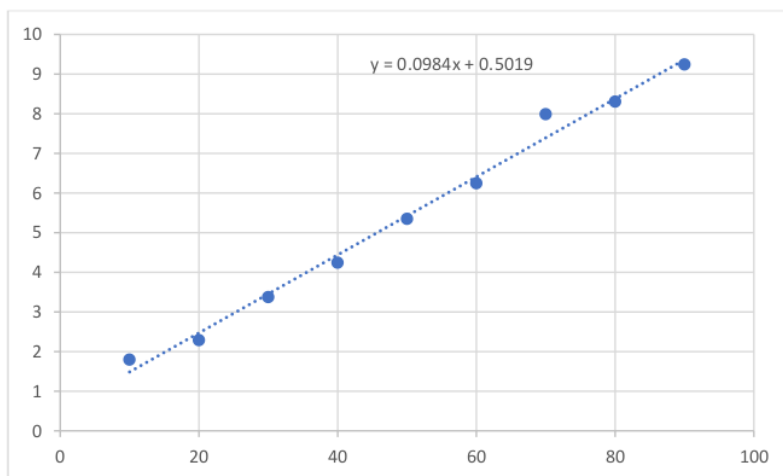
Sensitivity = 0.0691 RH%

Zero = -0.0098 V

Max Non Linearity = 14.56%



70 DEG



Sensitivity = 0.0984 RH%

Zero = 0.5019 V

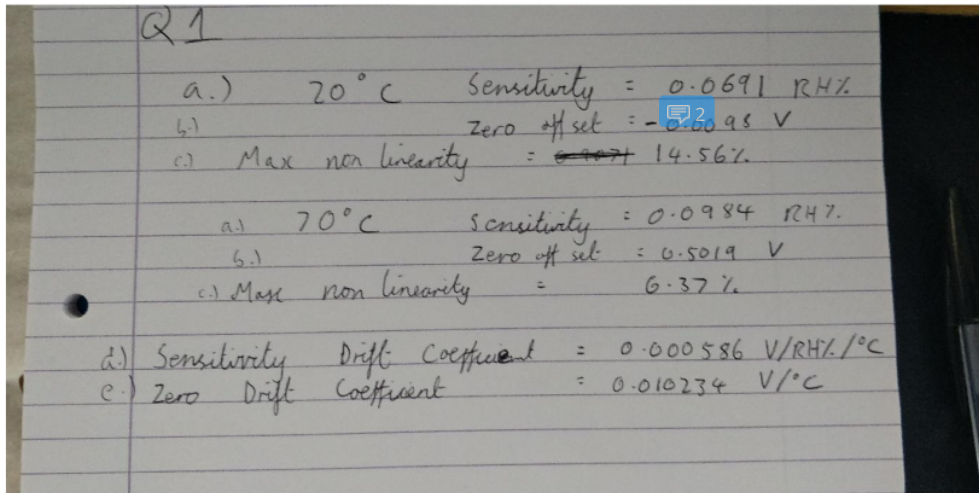
Max Non Linearity = 6.37%

Sensitivity Drift

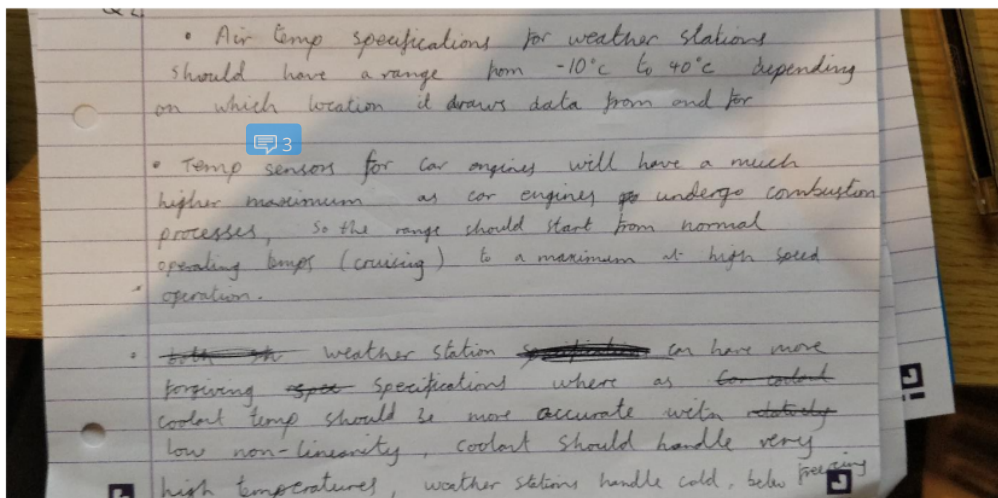
0.000586 V/RH%/DEG

Zero Drift

0.010234 V/DEG



Q2



Q3

Q3.

- passive filters could be implemented ~~in a~~ to filter out a range of specific frequencies
- minimize inductive and capacitive coupling by placing wires ~~as~~ far from the source
- twist each pair of signal wires, to have voltage induced ~~on~~ on each wire to be consistent
- Shielding signal source wires with drain wire
- use of difference amplifier

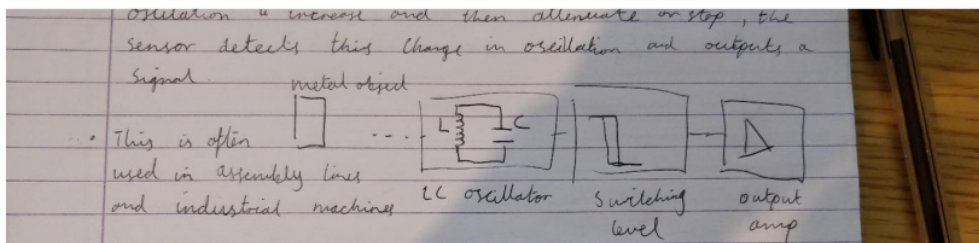
- isolating earths ~~wires~~, Power earth, logic earth, Analogue earth and safety earth

The diagram illustrates a signal path from an ADC to a difference amplifier. The ADC is connected to an optoisolator, which provides electrical isolation between the two circuits. The optoisolator's output is connected to the difference amplifier. The circuit includes several ground references: V_0 , $0V_0$, $0VA$, and $0VB$. A blue speech bubble icon with the number 4 is located on the right side of the diagram.

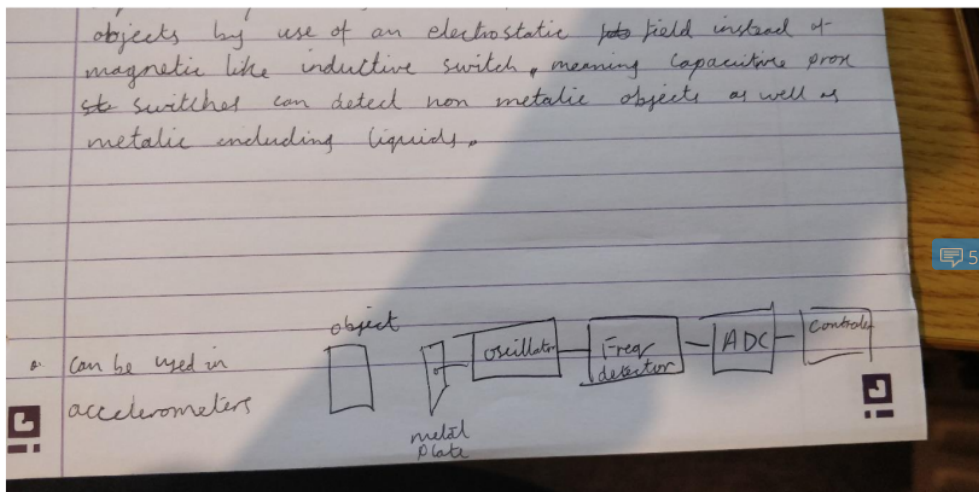
- optoisolator provides short optical transmission path while keeping the two circuits electrically isolated

Q4

Q4 Inductive proximity sensors are used to detect metallic objects. This is done by creating a magnetic field by having an alternating current going through a coil in the sensor. When a metallic object goes through the magnetic field, changing the electrical properties of the coil, the sensor detects the change in induction ~~current~~ ~~flow~~ ~~increase~~, an induction current flows in it due to electro magnetic induction, so when it approaches closer to the sensor, the induction ~~current~~ increases causing load on oscillation to increase and then attenuate or stop, the sensor detects this change in oscillation and outputs a signal.



Capacitive proximity switch, used to detect conductive objects by use of an electrostatic field instead of magnetic like inductive switch. meaning capacitive prox switches can detect non metallic objects as well as metallic including liquids.



Q5

Q5- Calibration is required for accurate measuring and ensuring ~~man~~ equipment is fit ~~of~~ for purpose

- Keeping an reference helps calibrating equipment
e.g. ~~keep~~ having 1 micrometer stored away and non-used so that it can serve as a reference for all other micrometers.
- Calibrations help define accuracy and quality of values obtained from measurements ~~and or~~
, over time and usage of equipment, accuracy tends to drift ~~and~~ due to external factors like temp, ~~and~~ humidity ~~and~~, wear and tear.

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GRADEMARK REPORT

FINAL GRADE

72/100

GENERAL COMMENTS

Instructor

Q1a) 6 Marks

Q1b) 6 Marks

Q1c) 3 Marks

Q1d) 5 Marks

Q1e) 0 Marks

Q2) 2 Marks

Q3) 16 Marks

Q4) 20 Marks

Q5) 14 Marks

Total 72 Marks

100 Marks Available

Total 72%

PAGE 1

PAGE 2



Comment 1

Q1a) Correct - 6 Marks

Q1b) Correct - 6 Marks

Q1c) incorrect - 3 Marks

20deg - Numbers are of the approximately correct magnitude but the sign is wrong

70deg - incorrect



Comment 2

Q1d) correct - 5 Marks

Q1e) incorrect - 0 Marks. No workings to award points for.



Comment 3

Q2 - You've only really discussed measurement range. You should also have mentioned precision, sensitivity, linearity, environmental compatibility, resolution and drift.

2 Mark



Comment 4

Q3) Good range of noise reduction and removal methods listed. A little more information was needed on twisted pair and the reason a difference amplifier is used.

16 Marks



Comment 5

Q4) Good description and explanation of their operation.

20 Marks



Comment 6

Q5) Good description of the need for calibration, although more detail was required on the process of calibration.

14 Marks